DINR™

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DINR

DINR

DINR

For Pro Tools TDM and AudioSuite Systems

DINR™

Software User's Guide

Version 3.0

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PN 932705993-00 Rev A 3/98

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Getting Started

Getting Started

Introduction

Thank you for purchasing Digidesign Intelligent Noise Reduction™ software for TDM and AudioSuite-capable Pro Tools® systems. DINR consists of a pair of DSP Plug-Ins which provide two types of noise removal:

1. Broadband Noise Reduction (BNR)

The BNR Plug-In provides broad and narrow-band noise reduction for suppressing such unwanted elements as tape hiss, air conditioner rumble, and microphone preamp noise.

2. Hum Removal

The Hum Removal Plug-In removes pitch-based noise such as guitar pickup buzz, AC line noise, and fluorescent hum.

DINR Features:

- Broadband and hum-based noise removal.
- Both DINR Plug-Ins can be used in real-time as TDM Plug-Ins.
- The Broadband Noise Reduction Plug-In can be used in non-real-time as an AudioSuite Plug-In. (*The BNR AudioSuite Plug-In is designed for use on Power Macintosh® computers only.*)
- Expandability. The more DSP available on your Pro Tools system, the more real-time DINR Plug-Ins you can utilize in a session.

System Requirements

In order to use the DINR Plug-In, you will need:

- A PCI or Nubus-based Pro Tools system. (A Power Macintosh is required in order to use the AudioSuite version of DINR.)
- Pro Tools software, version 4.1.1 or higher

For the latest list of qualified CPUs and hard drives, contact your Digidesign dealer or call Digidesign at (800) 333-2137. This list is periodically updated.

Installing The DINR Plug-Ins

The DINR Plug-Ins are copy-protected with a simple key disk protection scheme. Your *DINR Installer* disk permits one installation, referred to as a hard disk *authorization* of the DINR Plug-In. The *DINR Installer* floppy disk also permits you to reclaim this authorization from your hard disk if necessary.

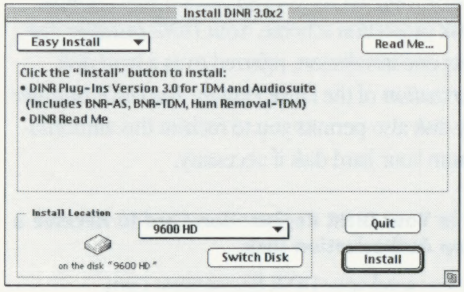
Send in Your DINR Registration Card to Receive a Backup Authorization Disk

When you send your DINR Registration Card, Digidesign Customer Services will mail you a floppy disk containing an additional authorization key for your DINR Plug-In. As a registered user you'll also receive periodic software updates and notification of upgrades. If you are an international customer, please consult the list of international distributors included with your system for registration. Don't delay. Send in your Registration Card as soon as possible.

If you are a DINR for Sound Designer II™ user, the DINR CD-ROM provides a separate installer for you. The installation procedure is fundamentally the same as the one given below. Please note that DINR SDII runs on NuBus-based systems only. To install DINR SDII, please click the "Install DINR-SDII" application. An electronic version of the DINR for SDII User's Guide will also be installed on your hard drive.

To install DINR on your computer:

1. If you are using virus-protection software, turn it off or temporarily remove it and restart your Macintosh.
2. Insert the *DINR CD-ROM* in your CD-ROM drive and double-click the file named *"Install DINR."*
3. When the *Install Notes* screen appears, read it for any important, late-breaking DINR information, then click *Continue* to proceed. This window appears:



The DINR Installer

4. Use the *Switch Disk* button to select the hard disk on which you wish to install the DINR Plug-In. Select the same drive on which you installed the Pro Tools application (your Startup Drive).
5. We recommend that you choose the *Easy Install* option. Do not use the *Custom Install* option unless you know exactly what you are doing — if you skip any essential items, your software may not function correctly.
6. Click *Install*. The DINR Plug-Ins will be installed in a folder named *"Plug-Ins"* in the DAE Folder within your System Folder.
7. During installation, the Installer will prompt you to insert the authorizer disk.
8. When authorization is complete, a dialog will appear indicating that the installation was successful. This dialog contains two buttons: *Quit* and *Continue*.
9. If you wish to install the DINR Plug-Ins on another hard disk, click *Continue* and perform additional installations.
10. If you are finished with your DINR installation, click *Quit to* return to the Finder. You do not need to restart your computer.
11. If you disabled any virus-protection software prior to installing DINR, don't forget to turn it back on.

Before using the DINR software, please take time to look over the "Read This First" document installed with DINR. It contains important late-breaking information not found in this User's Guide.

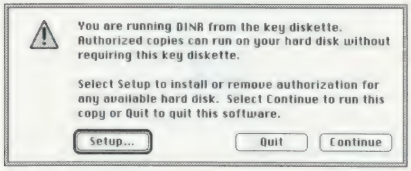
Deauthorizing the DINR Plug-Ins

Your *DINR Installer* disk allows a single hard disk authorization of the DINR Plug-Ins. Once you have used this, you cannot perform another authorization until you reclaim it using the DINR DeAuthorizer. The following section explains how to do this.

If you do not wish to learn how to deauthorize DINR at this at this time, you can skip this section.

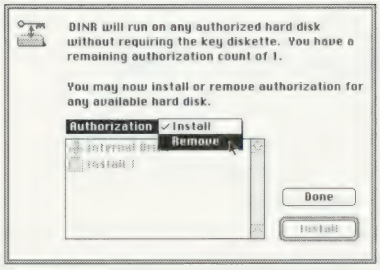
To deauthorize the DINR Plug-Ins:

1. Make sure that the hard disk you want to deauthorize is connected to the Macintosh and appears on the Finder's Desktop.
2. Insert the DINR authorization disk into your floppy drive.
3. Double-click the file named *"DINR DeAuthorizer."*
4. In the dialog that appears. Click *Setup*.


You are running DINR from the key diskette. Authorized copies can run on your hard disk without requiring this key diskette.
Select Setup to install or remove authorization for any available hard disk. Select Continue to run this copy or Quit to quit this software.
Setup...
Quit
Continue

The DINR DeAuthorizer

5. A second dialog appears, showing a list of connected hard drives. From the *Authorization* pop-up menu, select *Remove,* then select the appropriate hard drive (your Startup Drive).


DINR will run on any authorized hard disk without requiring the key diskette. You have a remaining authorization count of 1.
You may now install or remove authorization for any available hard disk.
Authorization
Install
Remove
Done

Selecting "Remove" in the DeAuthorizer dialog

6. Click the *Remove* button. The Deauthorizer removes the authorization from the selected hard drive. A dialog will appear confirming successful deauthorization. Click *OK* to proceed.
7. Click *Done* to return to the Finder.

Deauthorization is now complete. If you now try to launch Pro Tools, a dialog will appear informing you that you are using an unauthorized copy of the DINR Plug-Ins every time you start the application. This dialog only appears if you try to launch Pro Tools with a DINR Plug-In that is not currently authorized.

Deauthorization can also be performed with the DINR Installer using its "Remove" feature. If you select DINR for removal, the Installer will ask you to insert the DINR Authorizer *floppy disk to retrieve the authorization key.*

Do not lose your DINR CD-ROM or authorization disk! You will not be able to complete an installation without them. Keep them in a safe place to avoid any accidents.

DSP Requirements for DINR

DINR and other TDM Plug-Ins reside in DAE's memory. As each Plug-In is used, or *instantiated*, it uses up a portion of DAE's memory. The following section explains the memory requirements for each DINR Plug-Ins and how to allocate additional memory to DAE if necessary. This information applies to the real-time TDM version of DINR only. It does not apply to the AudioSuite version of the Broadband Noise Reduction Plug-In.

DSP Requirements for the TDM DINR Plug-Ins:

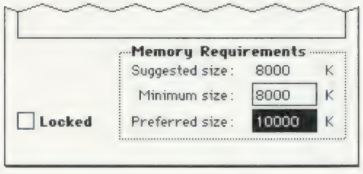
- A single DSP on a DSP Farm will power one DINR Broadband Noise Reduction Plug-In, either mono or stereo.
- A single DSP on a DSP Farm will power two stereo DINR Hum Removal Plug-Ins or four mono Hum Removal Plug-Ins.

Allocating Additional Memory to DAE

If you are using a large number of Plug-Ins in addition to your new DINR Plug-In, you may wish to allocate additional memory to DAE using the Finder's *Get Info* dialog in order to avoid low-memory problems with DAE.

To allocate additional memory to DAE for Plug-Ins:

1. Start Pro Tools so that DAE can calculate its basic memory allocation.
2. Go to the Finder, and under the Apple menu, choose *About This Macintosh*.
3. If you have 3 megabytes or more of memory available (as indicated in the *Largest Unused Block* portion of this window), go to step 4. If you have less than 3 megabytes of free memory (3,000k), stop here: Digidesign doesn't recommend allocating additional memory to DAE unless you purchase additional RAM (random-access memory) and install it in your computer.
4. Quit Pro Tools.
5. Open the DAE folder inside your System Folder, select DAE, and choose *Get Info* from the Finder's File menu.
6. Enter the desired amount of memory *above the minimum requirement* in the *Preferred Size* field. For example, if the *Preferred Size* currently says "8000k" and you wish to allocate an additional 2 megabytes of memory (1 megabyte equals 1000 kilobytes), then you should enter "10000" into the *Preferred Size* field.
7. Close the *Get Info* dialog.
8. The next time you start Pro Tools, DAE will use this new memory allocation.



Allocating additional memory to DAE

This completes installation of your DINR Plug-Ins. You should now be ready to start using DINR. Chapter 2 of this User's Guide explains the controls and parameters of the DINR Plug-In. Chapter 3 explains how to use both DINR Plug-Ins as real-time TDM Plug-Ins. Chapter 4 explains how to use the Broadband Noise Reduction Plug-In as a non real-time AudioSuite Plug-In.

We hope that you find many creative uses for DINR in your audio projects.

The DINR Plug-Ins Explained

The DINR Plug-Ins Explained

Introduction

This chapter explains the parameters and controls of the DINR Plug-Ins. After you have familiarized yourself with their functions, please refer to Chapter 3 to learn how to use them as a real-time TDM Plug-Ins and how to use the Broadband Noise Reduction Plug-In as a non-real-time AudioSuite Plug-In.

Broadband Noise Reduction

DINR's Broadband Noise Reduction module (BNR) removes many types of broadband and narrow-band noise from audio material. It is best suited to reducing noise whose overall character doesn't change very much: tape hiss, air conditioner rumble, and microphone preamp noise. In cases where recorded material contains several types of noise, the audio can be processed repeatedly according to the specific types of noise.

For noise that has more of a pitched quality, DINR's Hum Removal module may yield more satisfactory results. Hum Removal is covered later in this chapter.

How Broadband Noise Reduction Works

DINR's Broadband Noise Reduction module uses a proprietary technique called *Dynamic Audio Signal Modeling*™ to intelligently subtract the noise from the digital audio file. Noise is removed with multiple downward expanders that linearly decrease the gain of a signal as its level falls.

First, a *noise signature* is created by selecting and analyzing an example of the noise within the source material. Using this noise signature, a *noise contour* is created which is used to define the thresholds for the downward expanders for broadband noise reduction. The noise contour represents an editable division between the noise and audio signals.

At the same time, DINR also creates a model of what the "desired" audio looks like. DINR then attempts to pull apart these two models, separating the bad from the good—the noise from the desired audio. The noise portion can then be reduced or eliminated.

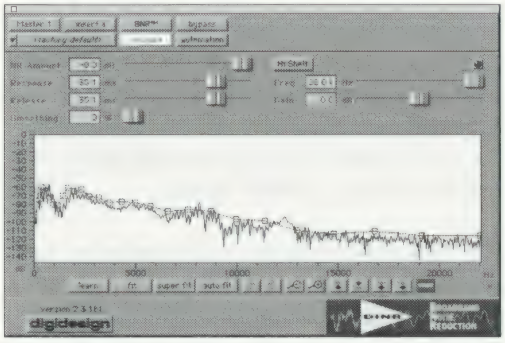
The noise reduction itself is achieved through the use of multiple *downward expanders*. The threshold of these expanders is set so that the noise signal will fall below the threshold and be decreased while the desired audio signal will remain above the threshold untouched.

Once the signal level has fallen below the specified *Contour Line* (which represents BNR's threshold), the downward expanders are activated and decrease the gain of the signal as its level falls. Over five hundred individual downward expanders are used linearly across the audio spectrum to reduce the effects of unwanted noise.

Psychoacoustic Effects of Noise Reduction

One of the psychoacoustic effects associated with broadband noise reduction is that listeners often perceive the loss of noise as a loss of high frequencies. This occurs because the noise in the higher frequency ranges fools the ear into thinking the original signal

has a great deal of energy in that range. Consequently, when the noise is removed it feels as if there has been a loss of high frequency signal. DINR's high-shelf EQ is useful for compensating for this effect. The high-shelf EQ is explained later in this chapter.

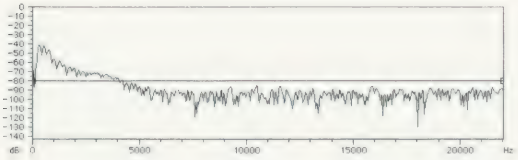


The BNR Plug-In

BNR Parameters

The following section describes the Broadband Noise Reduction parameters and their use.

The Spectral Graph

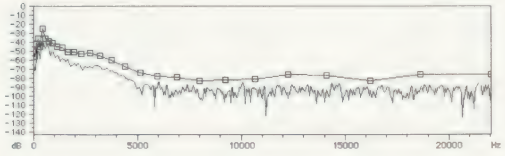


The *Spectral Graph* displays the *noise signature* and the editable noise *Contour Line*. The *Spectral Graph's* horizontal axis shows frequency, which is displayed in Hertz, from 0 Hz to one-half the current audio file's sample rate. The *Spectral Graph's* vertical axis shows amplitude, which is displayed in dB, from 0 dB to -144 dB (below full-scale output of the audio).

The Noise Signature

The jagged line is a graph of noise. This is called a *noise signature*. It is created when you use the *Learn* button in the Broadband Noise Reduction window. Once you have the noise signature of an audio file, you will be able to begin removing the noise by generating and editing a threshold or *Contour Line* (covered next) between the noise and the desired audio signal.

The Contour Line



The line with a series of square breakpoints is called the noise *Contour Line*. The Contour Line is an editable envelope which represents the division between the noise and the desired signal in the current audio file. The Contour Line is created by clicking the *Fit* or *AutoFit* button in the Broadband Noise Reduction window after you have "learned" a section of noise. By moving this envelope up or down, or by moving the individual breakpoints, you can modify which signals are removed and which remain.

The noise modeling process treats audio below the line as mostly noise, and audio above the line as mostly signal. Therefore, the higher your move the Contour Line upwards, the more audio is removed. To maximize noise reduction and minimize signal loss, the Contour Line should be *above* any noise components, but *below* any signal components. To fine tune the broadband noise reduction, move breakpoints at different locations along this line to find out which segments remove the noise most efficiently. Editing the Contour Line to follow the noise signature as closely as possible

will also help maximize noise reduction and minimize signal loss. Editing the Contour Line is explained in greater detail in Chapter 3.

The NR amount, Response, Release, and Smoothing sliders

Noise Reduction Amount

The *NR Amount* slider controls how much the noise signal is reduced. It is calibrated in decibels. A setting of 0 dB specifies no noise reduction. Increasing negative amounts specify more noise reduction. The default value is 0 dB.

In many cases, as much as 20-30 dB of noise reduction can be used to good effect. However, because higher amounts of noise reduction can generate unwanted audio artifacts, you may wish to avoid setting the *NR amount* slider to its maximum value.

Response

The *Response* slider adjusts how quickly the downward expanders/noise reduction process responds to the overall changes in the noise in milliseconds. Depending on the character of the noise, different settings of this control will produce varying amounts of artifacts in the signal, as the modeling process attempts to track the noise signal faster or slower.

The *Response* speed ranges from *0 ms* to *116 ms*. A setting of 116 ms (*slow*) specifies that the modeling process should *not* attempt to track very fast changes in the noise character. A setting of 0 ms (*fast*) specifies that the modeling process should attempt to follow every change in the noise character very closely. A faster setting can yield more noise removal, but it may generate more artifacts. This is similar to how a noise gate produces "chatter" when attempting to track highly dynamic material. A slower setting will allow slightly less noise removal, but will generate much fewer artifacts.

Release

The *Release* slider is used in conjunction with the *Response* slider. It controls how quickly DINR reduces the amount of noise reduction when the amount of noise present in the audio diminishes. *Release* times range from 0 ms to 116 ms. Like the *Response* control, a faster setting can yield more noise removal, but it may also generate artifacts. You may wish to avoid setting this control to its slowest position, since it will cause the noise tracking to slow to the point that the other parameters seem to have no effect.

Smoothing

The *Smoothing* slider controls the rate at which noise reduction occurs once the threshold is crossed. It allows you to reduce the audibility of any artifacts generated in the modeling process, at the expense of noise reduction accuracy. This is done by limiting the rate of change of the *Response* and *Release* controls to the specified *Smoothing* setting. As soon as the frequency threshold is reached, the full *NR amount* value is immediately applied according to *Response* and *Release* settings. When the frequency threshold is reached, DINR will ramp to the *NR amount* level. Settings range from 0 to 100%. A setting of 0% specifies no smoothing. A setting of 100% specifies maximum smoothing.

Hi Shelf EQ

The *Hi Shelf* filter is a noiseless filter that can be applied after noise reduction has been performed in order to compensate for a perceived loss of high frequency content. It is unique because it operates only on the signal, *not* on any remaining noise. The *freq* slider controls the center *frequency* of the filter. Values range from 20 Hz to 22 kHz.

The *gain* slider controls the gain of the filter. Values range from -12 dB to +6 dB. The Hi Shelf filter can be enabled/disabled by clicking the *Enable* button.

You can also use the High Shelf filter to reduce the amount of high frequencies in a signal. This is particularly useful if you are working with older recordings that are band-limited, since the high frequency content in these is probably made up of noise and not signal.

Learn

Clicking the *Learn* button creates a noise signature based on the audio segment currently selected on screen. There are two *Learn* modes: *Learn First Audio Mode* and *Learn Last Audio Mode*.

Learn First Audio Mode

Learn First Audio Mode is the default *Learn* mode. It is designed for use with audio that has an identifiable noise-only section that you can locate and pre-select. To use this mode, locate and select the noise-only portion of the audio, click the *Learn* button, start Pro Tools playback, and BNR will build a noise signature based on the first 16 milliseconds of audio playback. *First Audio Learn Mode* can be thought of as a "trigger-learn" mode, since noise capturing is triggered by the first audio that DINR receives.

Learn Last Audio Mode

Learn Last Audio Mode is activated by Option-clicking the *Learn* button. It is designed to allow you to locate and identify a segment of noise on-the-fly as you listen to audio playback. In this mode, you first Option-click the Learn button, then initiate audio playback. When you hear the portion of audio that contains the noise you wish to identify and remove, click the *Learn* button a second time. BNR will build a noise signature based on the last 16 milliseconds of audio playback. The Spectral Graph displays data in real-time in *Learn Last Audio Mode*.

Fit

The *fit* button computes a noise Contour Line with approximately 30 breakpoints to fit the shape of the current noise signature. The Contour Line can then be edited to more closely fit the noise signature or to reduce specific frequency bands by dragging, adding or deleting breakpoints. Pressing the Up Arrow or Down Arrow keys on your computer keyboard allows you to raise or lower the entire Contour Line, or a selected portion of the Contour Line. The Left/Right arrows allow you to move a selection left/right. To select a portion of the Contour Line with multiple breakpoints, hold down the Command key and click and drag the cursor to highlight the desired area.

After you use the *fit* function, BNR will automatically boost the entire Contour Line 6 dB above the noise signature so that all noise components of the audio file are below the Contour Line. You may wish to adjust the Contour Line downwards as needed to modify the character of the noise reduction.

Super Fit

The *super fit* button creates a noise Contour Line consisting of over five hundred breakpoints in order to follow the shape of the noise signature more precisely.

Auto Fit

The *auto fit* function is designed to generate a noise curve for audio that lacks a noise-only portion for DINR to learn. Clicking *auto fit* computes this generic noise curve based on the points contained within the currently selected audio, then fits the Contour Line to it. To use the auto fit function, you must first make a selection in the Spectral Graph by holding down the Command key, then clicking and dragging the mouse.

If the selected audio has both noise *and* desired sound components, you can generate an *approximate* noise-only Contour Line by selecting a frequency range that appears to be *mostly* noise, then pressing the *auto fit* button. You can then edit the resulting noise Contour Line to optimize the noise reduction.

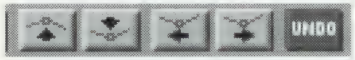
Scroll Left/Right

These buttons scroll the Spectral Graph to the left or right, respectively. The left arrow/right arrow keys of your computer keyboard will also scroll the Spectral Graph.

Zoom Out/In

Clicking on these buttons zooms in or out of the Spectral Graph. This allows you to view and edit the noise contour with greater precision. If you have selected a breakpoint or breakpoints, holding down the Control and Option keys and pressing the plus key (+) on your computer zooms the beginning of the selection to the center of the screen. Control-Option minus key (-) zooms back out.

Move Breakpoints Up/Down/Left/Right



These arrows behave differently depending on whether or not there is a selection of points along the Contour Line.

No Selection:

When there is no selection, the up and down arrows move the entire Contour Line up/down by 1 dB, respectively, and the Left and Right arrows scroll the display left and right.

With a Selection:

Clicking these buttons moves a selected breakpoint or breakpoints up, down, right, or left. If there is currently a selection in the Spectral Graph, clicking the left and right arrow buttons will move the selected breakpoints left or right. The up and down arrows will move the selected breakpoints up or down, respectively. Holding down the Control and Option keys and pressing the arrow keys on your computer keyboard perform the same functions.

Undo

Clicking the *Undo* button undoes the last edit to the Spectral Graph Display. The *Undo* button does not undo changes made to slider positions.

Hum Removal

DINR's Hum Removal module is designed to remove many types of harmonic noise from audio material. It is especially effective on noise such as AC line hum, light dimmer buzz, generator noise, guitar pickup noise, fluorescent hum, passing car drones, and noise from computer monitor emissions. The Hum Removal Plug-In does this by utilizing a 200-notch comb filter to remove the individual frequency components—fundamental and associated harmonics—from the audio material.

How Hum Removal Works

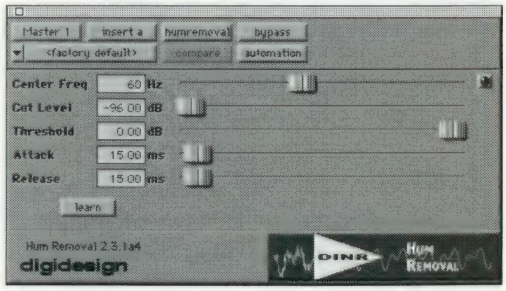
The Hum Removal module provides harmonic filters specifically designed to remove harmonic pitched noise. Harmonic noise is noise that not only contains a fundamental frequency component, as in the 60 Hz component of AC line noise, but also contains significant components at the odd and/or even harmonics of the fundamental frequency. If you were to remove only the 60 Hz component of AC line noise, you would still hear significant amounts of noise at 120 Hz (the second harmonic), 180 Hz (the third harmonic), and so on.

Harmonic filters will remove not only the fundamental frequency they are set to, but also all odd and even harmonics of that frequency. The advantage of this type of filter is that it effectively creates hundreds of digital notch filters at exactly the frequencies needed to remove certain types of noise.

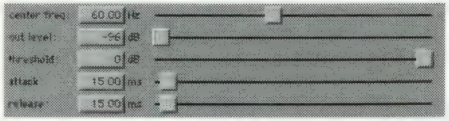
However, while a harmonic filter is extremely efficient, it also has drawbacks. The disadvantage of this type of filter is that it can alter the sound by imparting a ringing or phase canceling quality to the sound. The harmonic filters used in the Hum Removal module give you the ability to choose the best balance between noise reduction and the amount of undesired sound alteration that occurs.

Hum Removal Parameters

The following section describes the Hum Removal parameters and their use.



The Hum Removal Plug-In



Center Frequency

The *Center Frequency* slider sets the fundamental frequency of the Harmonic filter. Though the *Learn* function automatically sets the center frequency to the fundamental frequency of the learned noise, this parameter can also be manually edited. The other notches in the harmonic filter are automatically set to the related harmonic frequencies.

Cut Level

The *Cut Level* slider determines the depth of the notches within the Harmonic Filter. This allows you to specify the amount of hum removal that takes place when the signal falls below the threshold. Higher -dB settings result in deeper notch filters and more noise reduction. Lower -dB settings produce fewer undesired alterations of the audio. A cut level of 0 dB applies no harmonic filtering. A cut level of -∞ applies maximum hum removal.

Threshold

The *Threshold* slider sets the signal level at which the harmonic filtering occurs. If the input signal level is *below* the threshold, the harmonic filter is activated and hum is reduced. When the signal level rises *above* the threshold, the harmonic filter is bypassed, since loud signals psychoacoustically mask the audibility of noise components.

Setting the threshold to 0 dB (its highest level) will cause the harmonic filter to always be active. For optimum hum removal and a minimum of artifact generation, adjust the *Threshold* so that it is just above the noise level.

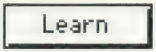
Attack

The *Attack* slider controls how long it takes the Harmonic Filter to reach its full effect once the signal has fallen below the threshold you have set. The default attack value is 15 ms.

Release

The *Release* slider controls how long it takes the Harmonic Filter to switch off once the signal has increased above the threshold (determined by your Threshold setting). The default release value is 15 ms.

Learn



The *Learn* button analyzes the selected audio and automatically sets the center frequencies of the filters for maximum hum removal. The *Learn* function saves you the trouble of manually sweeping through the frequency controls in order to find the appropriate fundamental center frequency for hum removal. There are two *Learn* modes: *Learn First Audio Mode* and *Learn Last Audio Mode*.

Learn First Audio Mode

Learn First Audio Mode is the default *Learn* mode. It is designed for use with audio that has an identifiable noise-only section that you can locate and pre-select. To use this mode, locate and select the noise-only portion of the audio, click the *Learn* button, start Pro Tools playback, and the Hum Removal Plug-In will set an appropriate fundamental center frequency for hum removal based on the first 16 milliseconds of audio playback. *First Audio Learn Mode* can be thought of as a "trigger-learn" mode, since noise capturing is triggered by the first audio that DINR receives.

Learn Last Audio Mode

Learn Last Audio Mode is activated by Option-clicking the *Learn* button. It is designed to allow you to locate and identify a segment of noise on-the-fly as you listen to audio playback. In this mode, you first Option-click the Learn button, then initiate audio playback. When you hear the portion of audio that contains the noise you wish to identify and remove, click the *Learn* button a second time. The Hum Removal Plug-In will set an appropriate fundamental center frequency for hum removal based on the last 16 milliseconds of audio playback.

In order for Hum Removal to learn the audio signal from live inputs, Pro Tools must be in playback mode.

Signal Present LED

The signal present LED is lit when signal is present in BNR.

Conclusion

This concludes the explanation of the DINR Plug-Ins' parameters. Now turn to Chapter 3 to learn how to use the DINR Plug-Ins in real time.

Using The DINR Plug-Ins as Real-Time TDM Inserts

Using the DINR Plug-Ins as Real-Time TDM Inserts

Introduction

This chapter explains how to use the Broadband Noise Reduction and Hum Removal Plug-Ins as real-time TDM inserts. It assumes that you have a basic working knowledge of Plug-Ins and their conventions. If you need more detailed instructions about the how and why of using Plug-Ins, please refer to *Working with Plug-Ins* chapter of your Pro Tools *Reference Guide*. There you'll find a comprehensive guide to the Plug-In-related features and functions of the Pro Tools software.

If you are using the DINR Plug-In with a Third-party audio sequencer, please consult that application's User's Guide for information specific to using Plug-Ins.

The Limitations of Noise Reduction

It is important to understand that there is a certain amount of trade-off inherent in any type of noise reduction system. Implementing noise reduction means that you have to choose the best balance between the following three things:

1. The amount of *noise* removed from the signal
2. The amount of *signal* removed from the signal
3. The amount of *artifacts* added to the signal

DINR gives you a considerable amount of control over the above three parameters and allows you to maximize noise reduction while minimizing signal loss and artifact generation. However, as powerful as it is, DINR does have limitations. In particular, there are two instances in which DINR may not yield significant results:

1. Cases in which the noise components of the audio are so prominent that they obscure the actual signal components of the audio.
2. Cases in which the noise amplitude of a 24-bit file is less than -96 dB. DINR is not designed to recognize noise that is lower than this level.

Please keep this in mind as you put DINR to use in your sessions.

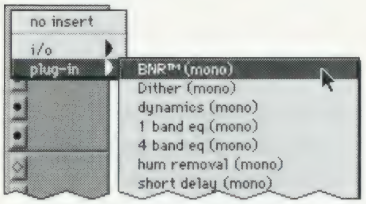
Using Broadband Noise Reduction

When you use DINR in real time as a TDM insert, it will process audio non-destructively during playback. This allows you make good use of its effects without permanently modifying the original audio file. Both DINR's Broadband Noise Reduction module and Hum Removal module can be used this way. The section that follows explains how to use the BNR module.

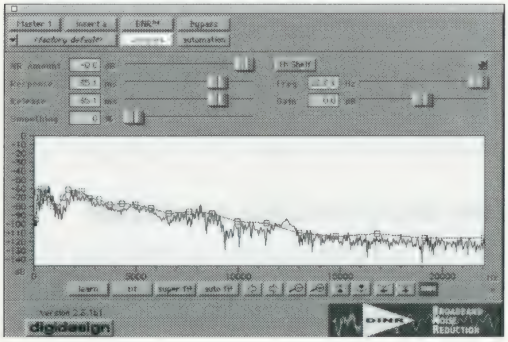
Before You Begin

Before you start using BNR, take a moment to think about the nature of the noise in your session and where it's located: Is it on a single track, or several tracks? Is it a single type of noise, or several different types? The answers to these questions will affect how you use BNR.

If there is a single type of broadband noise on a single track, simply insert the BNR Plug-In onto the offending track. We suggest that you solo the track to make it easier hear as you remove the noise. If a single track contains different types of noise, you may need to use more than one DINR insert to remove the other types of noise. If multiple tracks contain the same noise, you may wish to bus them all to an auxiliary input so you can use a single DINR Plug-In insert. This will minimize the amount of DSP you use.



Selecting Broadband Noise Reduction as an insert



The Broadband Noise Reduction window

To use Broadband Noise Reduction:

1. Click the *Inserts* pop-up on the track with the noise and select *BNR*. The Broadband Noise Reduction window appears.

2. In Pro Tools' Edit window, use the Selector to select the noisiest portion of the track—ideally, a segment with as little of the *desired signal* as possible. This will make it easier for BNR to accurately model the noise. If the track contains a segment comprised of noise only, select that portion.

3. Begin audio playback by pressing the Space bar, and in the Broadband Noise Reduction window, click the *Learn* button. BNR samples the first 16 milliseconds of the selected audio and creates its noise signature.

4. Alternatively, you can conveniently locate and identify noise on the fly, during playback, using BNR's *Learn Last Audio* mode. To do this, hold down the Option key and click the *Learn* button. Begin Pro Tools' playback, and when you hear the segment that you wish DINR to sample as noise, click *Learn* a second time. BNR will build a noise signature based on the 16 milliseconds of audio immediately preceding the 2nd click.

5. Click the *Fit* button. BNR will fit a Contour Line to the noise signature just created. If you wish to create a Contour Line that follows the noise signature even more precisely, click the *Super Fit* button. A Contour Line consisting of roughly 500 breakpoints is created.

6. In order to audition the effects of the noise reduction interactively, in the Edit window, select a portion of audio containing the noise (if you haven't done so already). Then select *Loop Playback* from Pro Tools' Options menu and press the Space bar to begin looped audio playback.

7. Adjust the *NR amount* slider to reduce the noise by the desired amount. To compare the audio with and without noise reduction, click the *Bypass* button.

8. To fine tune the effects of the noise reduction, adjust the *Response*, *Release*, and *Smoothing* sliders to achieve optimal results. Refer to the explanations of these sliders in Chapter 2 for more details.

9. To further increase noise reduction, edit the Contour Line. The quickest way to do this is to move the entire Contour Line upwards. In the Spectral Graph, hold down the Command key and select the entire waveform range. Then click the *Move Breakpoint Up* button (or hold down Control-Option and press the Up Arrow key on your computer). The higher you move the Contour Line above the noise signature, the more noise is removed. For more detailed instructions on this technique, refer to the section entitled, *Editing the Contour Line*, later in this chapter.

10. If you feel that some of high end frequencies of the audio have been lost due to the noise reduction process, try using the *Hi Shelf EQ* to compensate. To do this, click BNR's *Hi Shelf* button and adjust the *frequency* and *gain* sliders until you are satisfied with the results.

11. If you are happy with the results of the noise reduction, you may wish to save the settings so that you can use them again in similar sessions. Please refer to the section entitled, *Saving and Loading DINR Settings*, later in this chapter.

Keyboard Shortcuts

- For finer adjustments, hold down the Command key, then drag the desired parameter slider.
- To return a control to its default value, Option-click on it.
- To enable Learn Last Audio mode, Option-click the Learn button or press Control-L. This button flashes red when armed for Learn Last Audio mode. When you hear the target noise, click *Learn* a second time.

Performing Noise Reduction on Audio that Lacks a "Noise-Only" Portion

Ideally, audio that you wish to perform noise reduction on will have a noise-only portion at the beginning or end of the recording which DINR can analyze and learn. Unfortunately this is not always the case, and in many recordings some amount of signal is always mixed with the noise. Obviously, analyzing such audio will produce a noise signature that is based partially on signal. Luckily, DINR has provisions for cases such as this, and this is where the *Auto Fit* feature comes in.

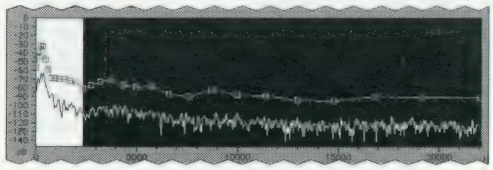
If your audio file lacks a noise-only portion for DINR to analyze, you can still obtain reasonable results by selecting and learning a segment of audio which has a relatively *low* amount of signal and a *high* amount of noise (as in a quiet passage). By then selecting a frequency range of the noise signature and using the *Auto Fit* function to generate a generic noise curve, you can recompute the Contour Line based on this selection.

Some editing of the newly generated Contour Line will probably be necessary to yield optimum results, since is not based entirely on noise from your audio file. You'll learn more about how to edit the Contour Line in the section entitled, *Fine Tuning Noise Reduction by Editing the Contour Line*, later in this chapter.

To generate a Contour Line for audio that lacks a "noise-only" portion:

1. In Pro Tools' Edit window, locate and select a segment of audio with a relatively low amount of signal and a high amount of noise.
2. Click the *Inserts* pop-up on the track with the noise and select *BNR*. The Broadband Noise Reduction window appears.
3. Click the *Learn* button to create a preliminary noise signature.

4. Click the *Fit* button to fit a Contour Line to it.
5. In BNR's Spectral Graph, hold down the Command key and make a selection. Try to select points where the high-frequency noise components are most evident. In general, the flatter areas of the Spectral Graph, are better, since they represent quieter areas where there is probably less signal and more noise. See the illustration below.
6. Click the *Auto Fit* button. DINR computes a generic noise curve and corresponding Contour Line based on your selection. If you wish to remove the selection in the Spectral Graph Display, hold down the Command key and click once.
7. Follow the steps given in the previous section removing the noise using the *NR Amount* slider and other controls.
8. Since the Contour Line is not based entirely on noise from your audio file, you may also wish to edit its envelope in order to fine-tune the noise reduction. Please refer to the section entitled, *Fine Tuning Noise Reduction by Editing the Contour Line*, later in this chapter for details on how to do this.



Noise components are more evident in flatter areas of the Spectral Graph

Fine Tuning Noise Reduction by Editing the Contour Line

One of the most effective ways to fine tune the effects of broadband noise reduction is to edit the Contour Line. As you learned in Chapter 2, the Contour Line treats audio below the line as mostly noise, and audio above the line as mostly signal. Therefore, the higher your move the Contour Line upwards, the more audio is removed.

To maximize noise reduction and minimize signal loss, the Contour Line should be *above* any noise components, but *below* any signal components. To fine tune the broadband noise reduction, try moving individual breakpoints at different locations along this line to find out which segments remove the noise most efficiently. For more dramatic results, try moving the entire Contour Line upwards. One drawback of the latter technique is that it will typically remove a considerable amount of signal along with the noise.

Remember that high-frequency noise components are typically more evident in the flatter, lower amplitude areas of the Spectral Graph. Try editing the Contour Line in these areas first.

Before you Begin

To hear the effects of the changes you make to the Contour Line in real time, do the following:

1. Select the target audio in Pro Tools' Edit window. Make sure the selection is at least a second or two in length. If the selection is too short, you won't be able to loop playback.
2. Select *Loop Playback* from the Options menu.
3. Press the Space bar to begin playback.

To edit the Contour Line:

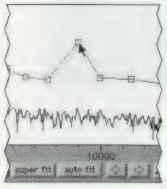
1. To move a breakpoint, click directly on it and drag it to the desired position. Moving a breakpoint higher increases noise reduction at that range. Moving a breakpoint lower decreases noise reduction at that range.

2. To move multiple breakpoints, hold down the Command key, then click and drag to select the desired breakpoints. Click the appropriate *Move Breakpoint* button (below the Spectral Graph) to move the selected breakpoints in 1 dB increments. Command-Shift-dragging will extend your selection. (To deselect a group of breakpoints, Command-click once in the Spectral Graph Display.)

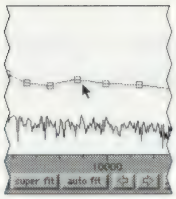
3. To move the entire Contour Line, hold down the Command key, then click and drag to select the entire range. Click the appropriate *Move Breakpoint* button (below the Spectral Graph) to move the selected breakpoints in 1 dB increments. The higher you move the Contour Line above the noise signature, the more noise is removed.

4. To create a new breakpoint, click on the Contour Line.

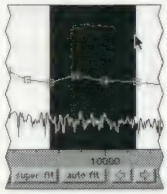
5. To delete a breakpoint, Option-click on the breakpoint. As long as the mouse button is held down, you will delete all breakpoints that the cursor passes over.



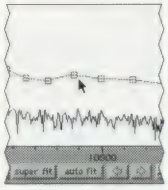
To move a single breakpoint, click and drag it to the desired position



To create a new breakpoint, click on the Contour Line

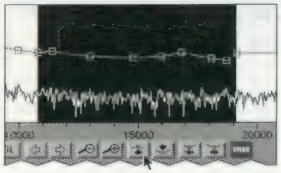


To select multiple breakpoints, hold down the Command key, then click and drag the mouse



To delete a single breakpoint, Option click on it

To delete multiple breakpoints, select them, and press the Delete key



The "move breakpoint" buttons allow you to move selected breakpoints up, down, left, or right

Keyboard Shortcuts

- To move selected breakpoints using your computer keyboard, hold down Control-Option, and press the appropriate Arrow key on your keyboard (up, down, left, or right).
- To zoom out the Spectral Graph, press Control-Option-minus key (-).
- To zoom in the Spectral Graph, press Control-Option-plus key (+).
- To scroll left in the Spectral Graph, press Control-Option-left arrow. (The display will scroll only if there are no breakpoints currently selected.)
- To scroll left in the Spectral Graph, press Control-Option-right arrow key. (The display will scroll only if there are no breakpoints currently selected.)

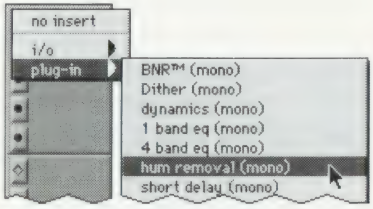
Using Hum Removal

As in the BNR module, you must have Hum Removal *learn* the target noise in an audio track. To learn the noise, the Hum Removal module sweeps through the material's frequency spectrum, scanning the noise to find the most prominent frequency characteristic of the audio signal. When this is completed, it automatically configures itself for maximum hum removal by setting its *center frequency* parameter to the fundamental frequency of the most prominent hum.

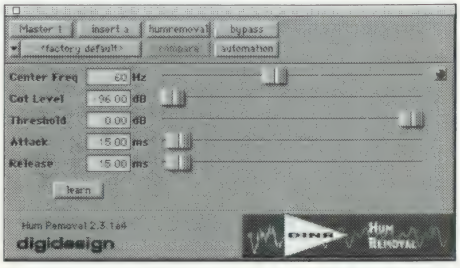
Before You Begin

Before you start using Hum Removal, think about the nature of the noise and where it's located: Is it on a single track, or several tracks? Is it a single type of noise, or several different types? The answers to these questions will affect how you use Hum Removal.

If there is a single type of hum on a single track, simply insert the Hum Removal Plug-In onto the offending track. We suggest that you solo the track to make it easier hear as you remove the noise. If a single track contains different types of noise, you may need to use more than one DINR insert to remove the other types) of noise. If multiple tracks contain the same noise, you may wish to bus them all to an auxiliary input so you can use a single DINR Plug-In insert. This will minimize the amount of DSP you use.



Selecting Hum Removal as an insert



The Hum Removal window

To use Hum Removal:

1. Click the *Inserts* pop-up on the track with the noise and select *Hum Removal*. The Hum Removal window appears.

2. In Pro Tools' Edit window, use the Selector to select the portion of the track where the hum is strongly present—ideally, a segment with as little of the *desired signal* as possible. This will make it easier for the Hum Removal module to accurately analyze the hum. If the track contains a segment comprised of hum only, select that portion.

3. Begin audio playback, and in the Hum Removal window, click the *Learn* button. The Plug-In samples the first 50 milliseconds of the selected audio and searches for the most prominent hum frequency.

4. Alternatively, you can conveniently locate and identify hum on the fly, during playback, using the Hum Removal module's *Learn Last Audio* mode. To do this, hold down the Option key and click the *Learn* button. Begin Pro Tools' playback, and when you hear the hum that you wish to identify, click *Learn* a second time. The Plug-In will identify the hum based on the 50 milliseconds of audio immediately preceding the 2nd click.

5. Adjust the *Cut Level* slider to increase/decrease the degree to which the hum frequency is cut. Although the Hum Removal module automatically sets the *Cut Level* to maximum hum removal, you may still wish to adjust this parameter to minimize any undesired side-effects. To compare the audio with and without noise reduction, click the *Bypass* button.

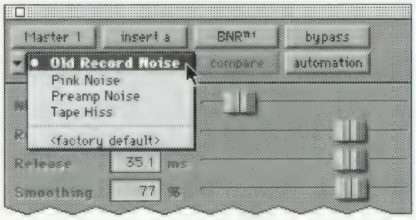
6. To fine tune the effects of the hum removal, try adjusting the *Threshold, Attack,* and *Release* sliders. If necessary, see Chapter 2 for more details on these how these parameters affect the hum removal process.

Saving, Importing, Copying, and Pasting DINR Settings

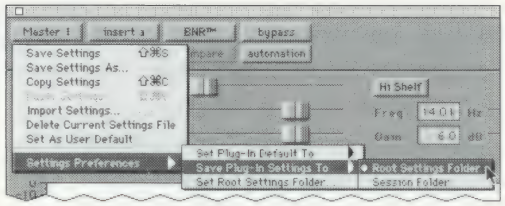
In the course of using DINR, you will find parameter settings that work particularly well in certain recording scenarios. For instance, you may find a group of settings that work well for removing air conditioner noise from a vocal recording. Pro Tools' Plug-In *Librarian* and Plug-In *Settings* pop-up menus make it easy to create your own library of commonly used DINR settings.

In addition to parameter settings, BNR can save and recall Contour Lines and noise signatures. This is particularly useful when you wish to save a representative noise signature and associated Contour Line for a particular type of noise.

If you have a noisy mixer, or other device with noisy preamps, for example, you may wish to specifically record the noise produced by that device, learn its noise signature with DINR, and create a corresponding Contour Line. The noise signature, Contour Line, and parameter settings can then be saved and used to remove the device's noise from any recording in which it appears.



The Librarian pop-up menu



The Settings pop-up menu

Once you create and save DINR settings files to disk (and let Pro Tools know where to look for them by assigning their "root" folder) they will appear in the *Librarian* pop-up in the Inserts/Sends Editor. This provides fast, easy access to your library of DINR settings. You can save your Plug-In Library to a permanent location that you specify, or you can save the settings in use in the current session to a *Plug-In Settings* folder that Pro Tools will automatically create for you. You can also save settings to a location such as a floppy disk or a hard drive on a remote network.

Keep in mind that Pro Tools always saves the current settings of your Plug-Ins with your session. The librarian functions merely allow you to additionally access a permanent collection of settings for use in any session.

Setting a Destination Folder for Saved Settings

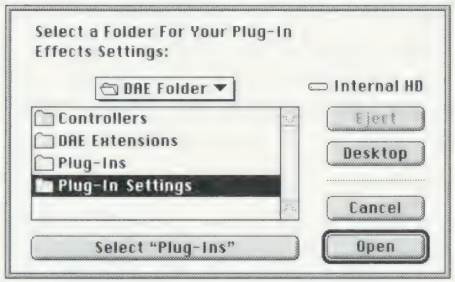
Before you save any DINR settings, you should set the destination folder for the settings files. To do this:

To set the destination folder for Plug-In settings files:

1. Make sure the Inserts/Sends Editor is open and that the desired DINR Plug-In is displayed.
2. Click the *Settings* pop-up menu and choose *Save Plug-In Settings To*. From the sub menu, choose either *Session's Plug-In Settings Folder* or *Root Settings Folder*.
3. If you choose to save your settings to your *Root Settings* folder, Pro Tools will save your files to the *Plug-In Settings* folder within your DAE Folder. If you wish to set an entirely different folder, you must tell Pro Tools which folder this is. To do this:

To set your Root Settings folder:

1. Click the Settings pop-up menu and choose *Settings Preferences*. From the sub menu, choose *Set Root Settings Folder*. This dialog appears:



The Set Root Settings Folder dialog

2. Normally Pro Tools will automatically select the *Plug-In Settings* folder within your DAE folder (the DAE folder resides inside the System Folder on your Startup Drive). This is a very convenient location for storing settings. However, if you wish, you can choose a different folder. In this dialog locate and select the folder that you wish to use as your *Root* folder and click the *Select "(your folder's name)"* button. Pro Tools will store all saved settings files there.

You are now ready to save your DINR settings.

Saving Plug-In Settings

The *Save Settings* command allows you to save DINR's current settings to the destination folder you have chosen with the *Save Plug-In Settings To* command.

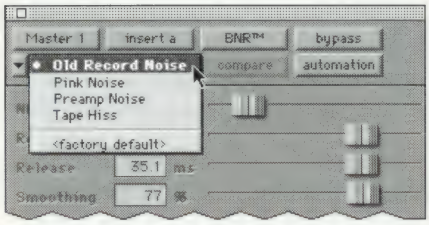
To save a Plug-In's settings:

1. Make sure the Inserts/Sends Editor is open and that DINR's parameters are set as you wish.
2. From the *Settings* pop-up menu, choose *Save Settings* (or press Command-Shift-S). A *Save* dialog appears, allowing you name the settings file. If you wish, you can also use this dialog to navigate to a different location to save your settings, or create a new folder destination for the file.
3. In the dialog, enter a name for the settings file.
4. Click *OK*. Pro Tools saves DINR's current parameter settings to the destination folder you specified earlier with the *Save Plug-In Settings To* command.

Once you have saved DINR settings files to disk (and let Pro Tools know where to look for them by assigning their *root* folder) they will appear in the *Librarian* pop-up in the Inserts/Sends Editor.

To recall settings saved in the root folder:

1. Make sure the desired DINR Plug-In appears as an Insert on the desired track.
2. Open the Inserts/Sends Editor by clicking that track's Inserts button.
3. When the Inserts/Sends Editor appears, click the *Librarian* pop-up menu and select the desired settings file. Pro Tools applies the selected settings to the currently displayed DINR Plug-In.



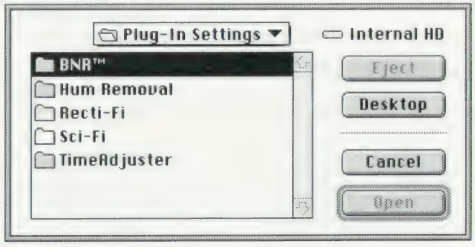
The Librarian pop-up menu

Importing Plug-In Settings

Once you have saved DINR Plug-In settings files to disk, you can import and use them at any time. In most cases this will not be necessary, since Pro Tools manages these settings files and makes them available for you. However, you may need to do this if you have moved your settings files to folders other than your *root* destination folder, or if you keep banks of settings files on another hard disk, floppy disk, or removable media.

To import a Plug-In settings file:

1. Make sure the Inserts/Sends Editor is open and that the desired DINR Plug-In is displayed on the desired track.
2. From the *Settings* pop-up menu, choose *Import Settings*. This dialog appears:



The Import Settings dialog

3. In the dialog, locate the desired settings file and click *Open*. Pro Tools loads the previously saved parameters into the Effects/Sends Editor where they are applied to the currently selected track.

4. Pro Tools will automatically create a copy of your imported settings file, and will save the copied settings file to disk in your current *root* destination folder for future use.

Copying Plug-In Settings

The *Copy Settings* command allows you to copy the settings from one Plug-In so that you can then paste them into another.

To copy a Plug-In's settings:

1. Make sure the desired DINR Plug-In is open and displayed in the Inserts/Sends Editor.

2. From the *Settings* pop-up menu, choose *Copy Settings* (or press Command-Shift-C). Pro Tools copies the settings of the currently displayed Plug-In.

Pasting Plug-In Settings

Once you have copied a Plug-In's settings, you can paste them into a destination Plug-In of the same type.

To paste a Plug-In's settings:

1. Make sure the Inserts/Sends Editor is open and that the destination DINR Plug-In is displayed on the desired track.

2. From the *Settings* pop-up menu, choose *Paste Settings* (or press Command-Shift-V). Pro Tools pastes the previously copied settings into the currently displayed Plug-In.

Creating Custom *User Default* Plug-In Settings

The *Set As User Default* command conveniently allows you to create a custom setting for any specific category of Plug-In and use those settings as the default *User Setting*. By doing this, your custom *User Setting* will always be available in the Librarian pop-up menu in the Inserts/Sends Editor. In addition, if you wish, you can use the *Set Plug-In Default To* command to have the Plug-In default to your custom settings whenever you first place it on a track. This feature is a real time-saver if you regularly use a particular setting, since it saves you the trouble of loading it each time you wish to use it.

To create a custom User Default setting:

1. Make sure the Inserts/Sends Editor is open and that the desired DINR Plug-In is displayed.

2. Set DINR's controls as you wish.

3. From the Settings pop-up menu, choose *Set As User Default*. Pro Tools defines the current settings as User Default for that DINR Plug-In.

4. If you wish for that DINR module to open with these settings each time you initially place it on a track, choose *Set Plug-In Default to* from the Settings pop-up menu, and then choose the *User Setting* sub-command. Pro Tools will use your User Settings as the default parameters for the chosen DINR module.

Automating DINR

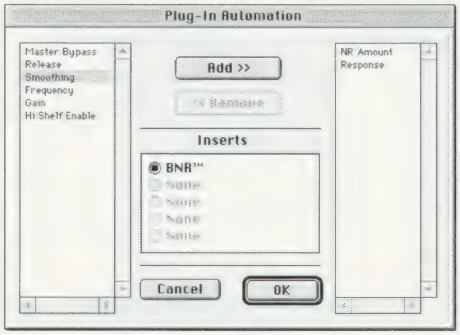
If you wish, you can use Pro Tools' automation capabilities to automate changes in DINR's parameters in real time. Since Pro Tools creates a separate playlist for each DINR parameter that you automate, you can later edit and modify each automated parameter individually, if you wish. This allows you to build up complex automation in stages.

To automate DINR:

1. From Pro Tools' Display menu, choose *Show Automation Enable Window*. The Automation Enable window appears.
2. In the Automation Enable window, click the *Plug-In* button to enable automation recording for Plug-Ins. You must do this before recording any automation for DINR.
3. In the Mix window, select the desired automation mode from the target track's *Automation* pop-up. For an initial automation pass, you may wish to choose *Auto Write*.
4. Open the Inserts/Sends Editor with the desired DINR Plug-In displayed.
5. Click the *Automation* button. When the *Plug-In Automation* dialog appears, select the parameters that you wish to automate and click the *Add* button. Only the parameters that you choose here will be automatable.
6. Click *OK* to close this dialog. The sliders of parameters that are automation record-enabled are highlighted in green.
7. When you are ready to begin, click *Play* or press the Space bar. Automation recording begins.
8. Move the sliders of the DINR parameters you have enabled for automation. Pro Tools records these automation moves.
9. When you have finished, click *Stop* or press the Space bar again. (If you are in *Touch* mode, automation recording will automatically stop when you release the mouse or controller, and fade back to the original level as specified in the *AutoMatch Time* Preference.)
10. Click *Return to Zero* and then *Play* on the Transport to listen to the effects of your automation.
11. If you are satisfied, make sure to save your session by choosing the *Save Session* command from Pro Tools' File menu.
12. If you wish to add additional automation or augment your previous pass, follow the above procedure, using *Touch* mode. This will allow you to add new automation only when you actually move a fader. It will not erase previous automation data unless you move the fader at that point in the session.

Before you automate any DINR parameters, be sure that Plug-In automation is enabled by clicking the "Plug-In" button in the Automation Enable window. (This button will highlight when it is enabled.)

Click the "automation" button to access the Plug-In Automation dialog



The Plug-In Automation dialog allows you to choose the DINR Plug-In parameters that you wish to automate

Keyboard Shortcuts

- Command-Option-Control-click a specific parameter in the Inserts/Sends Editor to access the *Plug-In Automation* dialog. The selected parameter will appear highlighted in the dialog.
- Command-Option-Control-click an Insert in the Mix window. The *Plug-In Automation* dialog will appear for the selected Plug-In.
- Command-Option-Control-click a track's *Display Format* pop-up in the Edit window to access the *Plug-In Automation* dialog.

Conclusion

You should now have a good understand of how to use the BNR and Hum Removal Plug-Ins in real time. Now turn to Chapter 4 to learn how to use the BNR AudioSuite in non-real time for file-based processing.

Using BNR AudioSuite

Using BNR AudioSuite

Introduction

The final chapter of this User's Guide explains how to use the AudioSuite version of the BNR Plug-In for file-based processing. Unlike real-time TDM Plug-Ins, AudioSuite Plug-Ins are not used during playback, but are instead performed on an audio file to process it *destructively*, creating a new file with the audio data permanently changed. The original file is retained in the Audio Regions List unless you choose otherwise.

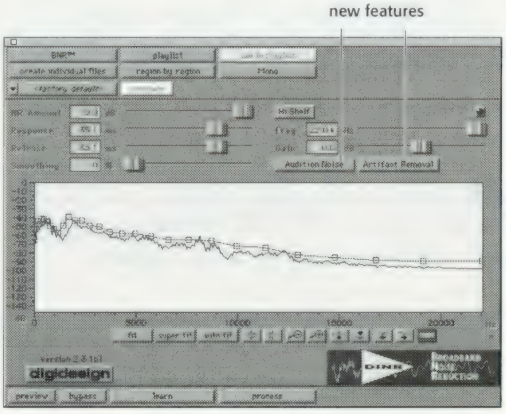
If you need more detailed instructions about the how and why of using AudioSuite Plug-Ins, please refer to the *Working with Plug-Ins* chapter of your Pro Tools User's Guide. There you'll find a comprehensive guide to the Plug-In related features and functions of the Pro Tools software. Because AudioSuite Plug-Ins can be used to permanently modify your source audio files on hard disk, it is very important that you understand how to use them before you process any audio.

Using BNR AudioSuite

BNR AudioSuite is identical to the real-time version of BNR, with the addition of two new features to enhance the noise reduction process:

- An *"Audition Noise"* button, that allows you to listen specifically to the noise portion being removed from the target material. This makes it easier to fine tune noise reduction settings to maximize noise reduction and minimize signal loss.
- An *"Artifact Removal"* button, that applies post-processing to the audio file to help remove undesirable artifacts that are a result of noise reduction.

To enable either of these features, simply click the corresponding button. To disable them, click again.



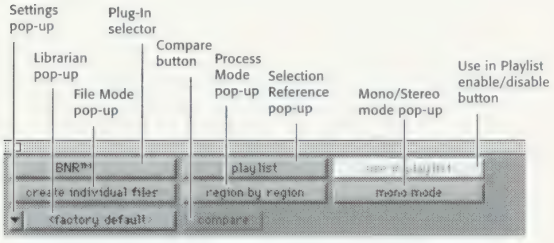
BNR AudioSuite

A Note About the "Preview" Function

The AudioSuite Plug-In window's *Preview* button conveniently allows you to preview a Plug-In's effect before you process the audio. Before you use this button, there are a few points you should be aware of:

- The performance of the *Preview* function depends on the speed of your Power Macintosh CPU. Faster computers are able to preview AudioSuite effects better than slower computers.
- The *Preview* function's output level is always at full volume. It is not controlled by the fader level of tracks containing the selected regions.

- Regardless of how many tracks/regions are currently selected, the *Preview* button will only play the *first* selected track if a Plug-In is in *mono* mode, or the first *two* consecutive tracks if the Plug-In is in *stereo* mode.



BNR AudioSuite Processing Parameters

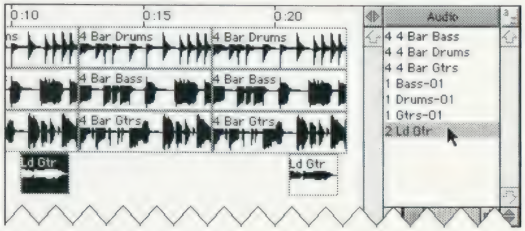
Please note that the "Preview" function always routes audio to channels 1-2 of the Audio Interface.

To process a region with the BNR AudioSuite Plug-in:

1. Select the desired regions in the target track(s) and/or in the Audio Regions List. Only tracks/regions that are selected will be processed.
2. From Pro Tools' AudioSuite menu, choose BNR. The BNR Plug-In appears.
3. Click the *Learn* button to learn the noise signature of the selected material. If you have selected more than one track/region, BNR will build the noise signature based on the *first* selected track/region when used in mono mode, or the first *two* selected tracks/regions when used in stereo mode.
4. Click the *Fit* or *Super Fit* button to create a Contour Line that matches the noise signature.
5. Click the *Preview* button to begin playback of the selected material.
6. Adjust BNR's parameters to achieve the effect that you wish. See Chapter 3 if you need more detailed instructions on how to set BNR parameters.
7. To fine tune the noise reduction, try editing the Contour Line using the techniques you learned in Chapter 3.
8. If you wish to listen specifically the noise components that are being removed, click and enable the *Audition Noise* button. Adjusting BNR's parameters while toggling this on and off will allow you to fine tune the noise reduction. It also allows you to hear exactly how much signal is being removed with the noise, and adjust your parameters accordingly.
9. If you can hear unwanted artifacts being generated by the noise reduction process, click and enable the *Artifact Removal* button to help eliminate them. For best results, set the *Response* and *Release* parameters to zero.
10. When you are ready, set BNR's AudioSuite processing parameters as you wish. These settings will determine how the file is processed and what effect the processing will have on the original region(s). Here are some guidelines:
    - To process the selected region only in the track in which it appears, choose *playlist* from the *Selection Reference* pop-up. Alternatively, if you wish to process the selected region in the Regions list only, choose *region list* from the *Selection Reference* pop-up.
    - If you wish to process and update *every* occurrence of the selected region throughout your session, click and enable the *use in playlist* button (and also choose *region list* from the *Selection Reference* pop-up). Alternatively, if you *do not* wish to update every occurrence of the selected region, disable the *use in playlist* button.

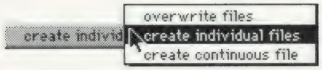
- To configure a Plug-In for destructive processing, choose *overwrite files* from the File Mode pop-up menu. This will overwrite and permanently modify the original source audio files.
- Alternatively, to configure BNR for non-destructive processing, choose *create individual files* from the File Mode pop-up menu. This will create new audio files that have been processed with the AudioSuite Plug-in and leave the original source audio files untouched.
- Or, if you have selected multiple regions for processing and wish to create a new file that connects and consolidates all of these regions together, choose *create continuous file* from the File Mode pop-up menu.

7. Click the *Process* button. The selected audio is processed according to the settings you have specified. Pro Tools appends an acronym to the region's name indicating the AudioSuite process that has been applied. The new audio files then appear in your session.



Selecting a region in the Regions List

Choosing the Selection Reference



Choosing the File Mode

Choosing the Process Mode

Automatic Region Creation on Partial Selections

AudioSuite Plug-Ins can be applied to whole regions, partial regions, or selections made up of whole and partial regions, across one or more tracks. When audio selected in the Edit window includes partial regions, the regions will automatically be split into two or more regions when they are processed. Processing will occur only on the selection, leaving other regions unchanged.

User Tips

- You may wish to group tracks that consist of stereo pairs. This will allow you to quickly select them on-screen.
- Name stereo pairs with suffixes such as " L/ R" (for example, "*Drums.L*" and "*Drums.R*"). This will keep pairs of audio files/regions together in the Regions List, and make it easy to select them for AudioSuite processing.

This concludes your DINR User's Guide. We hope you find many useful applications for DINR's powerful noise reduction capabilities in your projects.

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